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(54) Insertable liner for a narrow neck dispensing container and method of filling such a liner through the syphon tube

(57) A dispensing container (1) including an interior barrier bag (9) is disclosed, along with a method for filling the barrier bag (9) with a material to be dispensed. The dispensing structure includes a non-vented pump (13) and a syphon tube structure (6), and a mechanism for venting the interior of the container to the atmosphere (10) and for venting the interior of the barrier bag during filling (14). During assembly and filling, the barrier bag is wrapped or collapsed around the syphon tube structure (6), so that the syphon tube structure (6) and the barrier bag (9) can be easily inserted into a conventional container. After insertion, the barrier bag (9) is inflated (with either an air blast or the introduction of the dispensed product) and filled with product. After filling a pump structure (13) can be attached to the container. The method and apparatus allow a barrier bag device to be used on conventionally-designed container structures. The method and apparatus are particularly useful with containers which are made up at least partially of recycled materials. The apparatus is particularly useful for highly viscous products. The container (1) has a vented syphon tube structre (109) which is inserted into the container before it is filled. Filling is accomplished by inserting a filling nozzle (12) into the container (1) so that it cooperates with the top of the syphon tube (116). Filling of the container (1) therefore occurs through the syphon tube. The vent in the syphon tube structure allows the air in the container (1) to be vented as the container (1) is filled. Because the container is filled through the syphon tube, the product (105) completely fills the syphon tube at the time when the pump structure is inserted into the container. The vent structure (111) can be used as a vent for the container (1) during a dispensing operation as well.

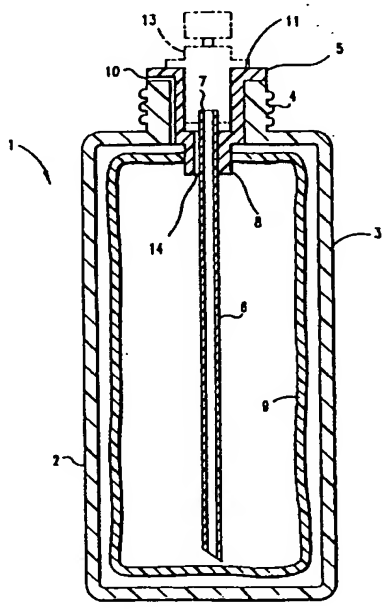

FIG. 1

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Description

Background of the Invention

Field of the Invention

The present invention relates to a dispenser including a dispensing pump and a dispensing container. More particularly, the present invention relates to a dispensing container which includes a barrier bag for protecting the dispensed contents from contamination within the container. The present invention also includes a syphon tube through which the container may be filled.

Description of the Related Art

It is generally known to provide a barrier bag within a dispensing device to protect the contents contained within the dispenser from any other materials which may be in the container. For example, U.S. Patent Nos. 4,008,830; 4,020,978; 4,457,455; 4,457,454; 4,696,415; 5,004,123; 5,012,956; 5,020,691; 5,115,944; 5,135,137; 5,137,179; 5,143,294; 5,156,295; 5,156,299; 5,156,300 and 5,176,294 each show dispensing devices wherein a barrier bag is used to surround and seal the dispensed contents within the dispensing container. Often, the barrier bag is used to prevent contact between a pressurized gas used to propel the contents out, e.g. in an aerosol device, and the contents themselves. In other prior art devices, the barrier bag is used to prevent contact between the dispensed contents and air which may be contained within the container.

In the prior art devices containing a barrier bag, it is often necessary to use a special fitting on the upper portion of the container to allow for the insertion and filling of the barrier bag. This special fitting makes prior art barrier bag systems incompatible with standard dispensing containers, and also requires additional assembly steps. Furthermore, the prior art devices containing barrier bags are not constructed to be used with conventional non-vented pumps which include a vented container structure. Finally, the prior art devices are normally filled through the bottleneck, with the dip tube being inserted after filling. For viscous products, such an arrangement often results in difficulty in priming the pump.

The present invention is directed to an insertable barrier bag or liner, that can be automatically inserted through the neck of a conventionally-shaped plastic bottle or container. The present invention includes structure for venting air from the interior of the barrier bag while the bag is being filled with product, as well as structure for venting air in the space between the interior walls of the container and the exterior wall of the barrier bag.

The venting structures of the present invention are provided in a fitting which is designed to fit within the neck of a container or bottle. The fitting is designed so that a bag made of a barrier material can be sealed on an outer surface of the fitting to provide a leakproof seal of the barrier bag to the fitting. The barrier bag is affixed in a position so that it clears the neck of the container when the fitting is inserted into the bottle or container, allowing the full expansion of the bag within the walls of the container.

The fitting is designed to receive a syphon tube with a diameter which permits the barrier bag to be wrapped around the syphon tube before insertion in the bottle or container. The barrier bag remains wrapped around the syphon tube by its own adhesion properties, static adhesion, or through use of an adhesive, and can thereby be easily and automatically inserted into the container through the neck of the container prior to a filling operation. Because the syphon tube is attached to the fitting structure and barrier bag when they are inserted into the container, a syphon tube structure need not be attached to the pump structure when it is connected to the container.

The fact that the barrier bag is wrapped around the syphon tube before filling is an advantageous feature of the present invention, because it minimises the amount of air trapped in the barrier bag, allowing filling of the barrier bag at maximum speed. The present invention is therefore advantageous because it allows easy assembly and filling of a dispensing container with an interior barrier bag and may be used on any conventionally shaped dispensing container or bottle used in conjunction with a conventional non-vented pump.

The present invention also includes an easy-to-manufacture structure for venting the container interior. The present invention is easy to insert into a container, and easy to fill once inserted into the container, without the use of complicated assembly or filling equipment. This arrangement is particularly advantageous when used with a viscous product, since it eliminates an air gap in the dip tube, which can make the pump hard to prime.

The present apparatus is particularly useful in that it does not require disassembly and reassembly of the pump structure during the filling process. The present invention therefore is much more economical and efficient, and allows easy priming of the pump.

Brief Description of the Drawings

FIGURE 1 shows a cross-sectional view of the present invention, with the barrier bag in an expanded state;

FIGURE 2 shows a cross-sectional bottom view of the barrier bag and fitment of the present invention;

FIGURES 3a and 3b show cross-sectional views of the fitment of the present invention;

FIGURE 4 shows a cross-sectional view of the

present invention, with the barrier bag wrapped around the dip tube;

FIGURE 5 shows a first embodiment of the syphon tube structure of the present invention during a filling operation;

FIGURE 6 shows the first embodiment of the syphon tube structure of the present invention after a filling operation, with the pump mounted to the container;

FIGURE 7 shows a second embodiment of the syphon tube structure of the present invention during a filling operation;

FIGURE 8 shows the second embodiment of the syphon tube structure of the present invention after a filling operation, with the pump mounted to the container;

FIGURE 9 shows a first alternative configuration of the syphon tube structure in the present invention;

FIGURE 10 shows a second alternative configuration of the syphon tube structure in the present invention;

FIGURE 11 shows a cross-sectional view of the syphon tube of the second alternative configuration, after the pump is mounted to the container;

FIGURE 12 shows a cross-sectional view of the syphon tube of the second alternative configuration, during the filling process.

Description of the Preferred Embodiment

Figure 1 shows an embodiment of the present dispensing device. A dispenser 1 includes a dispensing container 2. Dispensing container 2 may be of a conventional form which includes a relatively wide body portion 3 and a relatively narrow neck portion 4. Neck portion 4 can include threads for engagement with threads on a cap (not shown), or a cap could be crimped or attached by any known means to neck portion 4.

Inserted within container is a dip tube 6 for conveying a dispensed product from the container to a pump structure 7. Dip tube 6 is connected to a fitment 11 via a dip tube retaining portion 8 which retains the dip tube 6 and a barrier bag 9 in the container 2. As shown in Figure 2, the upper portion of barrier bag 9 is sealed (through conventional means e.g. ultrasonic welding or adhesives) to fitment 11 via the dip tube retaining portion 8, so as to seal the interior of barrier bag 9 from the interior of container 2. Figure 2 shows the barrier bag 9 in a flattened condition, for example when it is first attached to the fitment 11.

Barrier bag 9 is constructed of a thin sheet of a barrier film (e.g. foil or a polymeric material) which is bonded around the edges to form a sealed structure. As can be seen in Figure 2, the upper edges of the film which makes up the barrier bag 9 are bonded together at their radially outer ends, and as described above the radially inner portions of the upper edges of the film are bonded to the fitment 11 so that the bag is sealed to the fitment 11. The radially outer and lower edges of the film are bonded together to form a sealed barrier bag 9.

Figures 2, 3a and 3b show the particular structure of the fitment of the present invention. As can be seen in Figure 2, dip tube retaining portion 8 includes an outer surface upon which the barrier bag 9 is bonded to form a seal. A second vent structure 14 passes through the interior of the dip tube retaining portion 8 between the dip tube 6 and the dip tube retaining portion 8. As will be described below, this second vent structure 14 allows air to be vented out of the dip tube 6 and barrier bag 9 during filling. A vent structure 10 on the outer surface of fitment 11 allows the interior of the container 2 to be vented to the atmosphere to maintain atmospheric pressure on the exterior of the barrier bag 9. Fitment 11 includes a flange 5 to allow engagement of the fitment 11 with the neck 4 of container 2.

Figure 4 shows the barrier bag 9 and fitment 11 in their configuration immediately after insertion into container 2. In order to allow easy insertion of the bag 9 into a conventional container 2, the bag is initially wrapped around the dip tube 6 so as to exhibit a low cross-sectional profile. The barrier bag 9 can be retained in a position wrapped around the dip tube 6 through its own adhesive properties (as with some thermoplastics), through static adherence, or through the use of a low shear-strength adhesive on the exterior of the barrier bag 9. Although the barrier bag 9 is preferably wrapped around the dip tube 6, the barrier bag could also be collapsed around the dip tube in any other equivalent manner, including using a pleated barrier bag 9 which is collapsed in an "accordion" manner around the dip tube 6.

After the dip tube 6, barrier bag 9, and fitment 11 structures are inserted as a unit into the container 2, the barrier bag can be inflated to the shape shown in Figure 1. Inflation can be accomplished by an air blast directed from above down the dip tube 6, or can occur during filling of the barrier bag 9 with a product to be dispensed. To fill the barrier bag 9 with a product to be dispensed, a filling nozzle 12 (shown in dotted lines in Figure 4) is inserted into the interior of fitment 11 to engage the top 7 of dip tube 6, and product is dispensed down the dip tube 6 and into the interior of the barrier bag 9 until the barrier bag 9 is filled with product. A vent structure 10, consisting of a groove channelled into the exterior of the fitment 11, is used during filling to vent air into the interior of the container 2 which is displaced during filling of the barrier bag 9. A second vent structure 14 is used to vent air initially contained within the dip tube 6 and barrier bag 9 to the atmosphere as this air is displaced by product during filling of the barrier bag 9.

After barrier bag 9 is filled with product, a conventional pump structure 7 (shown in dotted lines in Figure 1) is inserted into fitment 11 and attached by any known conventional mechanism. The upper end 7 of dip tube 6 projects upwardly into fitment 11 so that it can be inserted directly into the inlet to pump 13. Pump structure 13 can include any form of conventional dispensing actuator/dispensing nozzle structure. Thus, as is known in the art, as an actuator on the pump 13 is actuated, product will be drawn into the pump 13 and dispensed out a nozzle on actuator. During the return stroke of the pump, product is drawn into the interior of pump 13 through dip tube 6; the atmospheric pressure which exists in the container 2 interior - by way of the venting structure 10 - allows fluid to be drawn into the pump 13 and the barrier bag 9 to gradually collapse around dip tube 6. Eventually, the barrier bag 9 will completely collapse around dip tube 6 as product is dispensed, so that removal of the dip tube 6, barrier bag 9 and fitment 11 can be easily accomplished through neck 4 of container 2. The container then can be refilled using the process described above, using a new barrier bag 9/dip tube 6/fitment.

As will be readily understood, the barrier bag 9, retaining structure 8 and container could have a variety of shapes, depending upon the particular application. Furthermore, the vent structures 10 and 14 could be located in a variety of locations on the disclosed structure, as long as they provide the recited functions above. It will be understood that multiple variations of the disclosed structure are contemplated within the scope of the claims below.

Fig. 5 represents the syphon tube structure of present invention during a filling operation. A container or bottle 1 of any conventional type used for holding a product to be dispensed has inserted therein a syphon tube structure 102. The syphon tube structure 102 can be a separately formed, as shown in Fig. 1, or could be integrally molded with container 1. Syphon tube structure 102 has a radially-extending flange 103 which cooperates with the neck 4 of container 1 to seat syphon tube structure 102 in container 1. Syphon tube structure 102 also has a syphon tube 108 and an upper portion 109. Syphon tube structure 102 is inserted into container 1 before container 1 is filled with product 105.

After insertion of syphon tube structure 102 into container 1, container 1 is fined with a product 105 to be dispensed from container 1. Filling is accomplished by inserting a filling nozzle 12 into the upper portion 109 of syphon tube structure 102. The bottom of filling nozzle 12 cooperates with a flange 110 on upper portion 109. Product 105 is then pumped or forced out filling nozzle 12, down syphon tube 108, and into container 1. Upper portion 109 has a vent path 111. As product 105 flows into container 1, the air in the container which it displaces is pushed up to the top of the container 1 and out vent path 111. Filling of product 105 into container 1 is continued until the quantity of product 105 in container 1 reaches a desirable level, generally when product 5 reaches the level of the flange 10.

Fig. 6 represents the apparatus of the present invention after filling has been completed, and immediately after insertion of a pump 13 (shown schematically in Fig. 2). The internal structure of pump 13 can be of any type known to those skilled in the art for dispensing product from a container. As can be seen in Fig. 2, because of the manner in which container 1 was filled according to the description above, the product has filled the interior of the syphon tube 108 all the way up to the flange 110. Therefore, when pump 13 is inserted into upper portion 109, as shown in Fig. 2, there is no air in syphon tube 108. The lower inlet 113 of pump 13 is inserted directly into product 105. Priming the pump requires only drawing the product 105 through lower inlet 113 and into pump 13. This arrangement makes priming of pump 13 much easier, since only the air in pump 13 must be evacuated, and there is no air in syphon tube 108 which must be drawn up and out of the nozzle. To aid in the filling and priming of the pump-container combination when highly viscous products are used, it is advantageous to make the syphon tube 108 of a relatively large diameter.

As shown in Fig. 6, pump 13 has an upper flange 114 which may cooperate with the flange 103 and neck 4 to secure the pump 13 to the container 1. Flange 114 can have a vent path 115. Vent paths 111 and 115 cooperate to allow venting of the container during dispensing operations, i.e., during operation of pump 112. Thus, as product 105 is drawn out of container 1 by the action of pump 13, air will travel through vent paths 111 and 115 to fill the resulting space in container 1.

Fig. 7 shows an alternative embodiment where the vent path 111 is located on flange 103. This embodiment allows the filling nozzle to cooperate with both the flange 110 and sidewalls 116 of upper portion 109. Fig. 8 shows this embodiment with the pump 13 inserted. As can be seen in Fig. 8, this embodiment allows the pump 13 body to cooperate with the flange 110 as well as sidewalls 116. There is therefore no need for an engaging flange on pump 13. Venting of the container during a dispensing operation can occur directly through vent path 111.

Fig. 9 demonstrates that the syphon tube 108 of the present invention need not be straight-sided as shown in Figs. 5-8. Syphon tube 108 may have a narrowed portion 120, or alternatively a series of stepped portions gradually increasing in diameter. The size and shape of syphon tube can be designed to be particularly effective for the degree of viscosity of the product to be dispensed. Stepping of the syphon tube 108 allows the portion of product left in the syphon tube after the container is empty to be reduced.

Figs. 10-11 show an alternative design of the syphon tube in the present invention. Figs. 11 and 12 are cross-sectional views of the syphon tube in this alternative design. As can be seen from these figures, the syphon tube is corrugated along its length. The syphon tube is constructed of a resilient material so that

it is normally in the configuration shown in Fig. 11. Fig. 12 represents the syphon tube configuration during a filling process. Thus, when filling nozzle **12** is inserted into upper portion **109** and product is pumped or forced out of filling nozzle **12**, the pressure of the product pushes the walls of syphon tube **108** outwardly so that the syphon tube assumes the configuration shown in Fig. 12. The increase in size of the diameter of the syphon tube **108** allows filling of the container **1** to proceed rapidly. After filling is completed, the resiliency of the syphon tube **108** causes the corrugations to collapse to the configuration of Fig. 11. This configuration allows the volume of the syphon tube **108** to be reduced. Reducing the volume of the syphon tube **108** ensures that there is a relatively small volume of product left over in the syphon tube after all of the product **105** has been evacuated from the container **1** during a dispensing operation. Although Fig. 10 shows the corrugated syphon tube structure used with the upper portion structure of Figs. 5-6, this syphon tube structure could be used equally well with the upper portion structure of Figs. 7-8.

One technique which can be used to assist in the filling of the apparatus of the present invention is to apply a vacuum to vent **111**, thereby drawing out excess air in container **1** and assisting in drawing product **105** from filling nozzle **12** into container **1**. This use of a vacuum is easily accomplished during a filling operation, and does not require disassembly of any of the parts of the apparatus, unlike the circumstance where the product must be drawn up a syphon tube by the application of a vacuum to the pump.

Claims

1. A method for filling a container with a product to be dispensed comprising the steps of:

   providing a narrow neck dispensing container;
   disposing a syphon tube structure at least partially within the container, said syphon tube structure comprising a syphon tube, such that said syphon tube extends substantially axially inwardly into the container;
   engaging a filling nozzle with the syphon tube structure near an axially outward end of said syphon tube;
   dispensing a product through said filling nozzle so that it flows through said syphon tube and into said container, whereby said product completely fills said syphon tube; and
   disengaging said filling nozzle from said syphon tube structure.

2. The method of claim 1, further comprising the step of:

   providing a vent path in said syphon tube structure, said vent path remaining open during said step of dispensing a product through said filling nozzle, whereby air within the container is vented from the container.

3. The method of claim 2, further comprising the step of:

   during said step of dispensing a product through said filling nozzle, applying a vacuum to said vent path to draw air from said container, and to draw said product into said container.

4. The method of claim 2, further comprising the step of:

   providing a flange which engages said container on said syphon tube structure, and providing said vent path through said flange.

5. The method of claim 2, further comprising the step of:

   providing an axially-inwardly projecting sidewall on said syphon tube structure, and providing said vent path through said sidewall.

6. The method of claim 1, further comprising the step of:

   attaching a pump to said syphon tube structure after said step of disengaging said filling nozzle from said syphon tube structure.

7. The method of claim 6, further comprising the step of:

   providing a circumferential flange connected to said syphon tube, and engaging said pump with said circumferential flange.

8. The method of claim 6, further comprising the step of:

   providing an axially-inwardly projecting sidewall on said syphon tube structure, and engaging said pump with said sidewall.

9. The method of claim 1, further comprising the step of:

   providing a circumferential flange connecting to said syphon tube and said syphon tube structure, said filling nozzle engaging said circumferential flange during said steps of engaging a filling nozzle with the syphon tube structure and dispensing a product through said filling nozzle.

10. The method of claim 1, further comprising the step of:

varying the diameter of said syphon tube along said syphon tube's axial length.

11. The method of claim 1, further comprising the step of:

corrugating said syphon tube such that during said process of dispensing a product through said filling nozzle, said syphon tube expands in diameter.

12. An apparatus for dispensing a flowable product comprising:

a container for holding said flowable product;
a syphon tube structure, said syphon tube structure comprising:

a syphon tube extending axially inwardly into said container;
an upper portion, said upper portion directly engaging said container, an axially outward end of said syphon tube being connected to said upper portion, said upper portion having a vent path, said vent path allowing air to enter and exit said container during a filling and a dispensing operation.

13. The apparatus of claim 12, wherein:

said upper portion is adapted to engage a filling nozzle to allow said product to fill said container via said syphon tube.

14. The apparatus of claim 12, wherein:

said upper portion engages said container via a circumferential flange, said vent path passing through said circumferential flange.

15. The apparatus of claim 14, further comprising:

a pump structure mounted on said container, said pump structure comprising a circumferential flange, said circumferential flange on said pump structure engaging said circumferential flange on said upper portion.

16. The apparatus of claim 15, further comprising:

a second vent path passing through said circumferential flange on said pump structure, said second vent path being aligned with said vent path.

17. The apparatus of claim 12, wherein:

said upper portion comprises an axially-inwardly extending sidewall, said vent path passing through said sidewall.

18. The apparatus of claim 17, further comprising:

a pump structure mounted on said container, said pump structure engaging said axially-inwardly extending sidewall.

19. The apparatus of claim 12, further comprising:

a pump structure mounted on said container, said pump structure having an inlet end adjacent an axially outward end of said syphon tube.

20. The apparatus of claim 19, wherein:

said upper portion comprises an axially-inwardly extending sidewall, said pump structure engaging said sidewall.

21. The apparatus of claim 19, wherein:

said upper portion comprises a circumferential flange, said pump structure engaging said flange.

22. The apparatus of claim 12, wherein:

said syphon tube structure is integrally formed with said container.

23. The apparatus of claim 12, wherein:

the diameter of said syphon tube varies along said syphon tube's axial length.

24. The apparatus of claim 12, wherein:

the syphon tube is corrugated.

25. The apparatus of claim 24, wherein:

the syphon tube is formed of a resilient material so that it normally biased into a collapsed condition.

26. An apparatus for filling and dispensing from a container comprising:

a tubular section; and
an upper section, said upper section being connected to said tubular section at an end of said tubular section, said upper section having a passage connecting an interior of said tubular

section with an interior of said upper section, said upper section further comprising:

a first flange adapted to engage an outlet of a container;
a vent path; and
a second flange adapted to engage a filling nozzle inserted into said upper section.

27. The apparatus of claim 26, wherein:

said tubular section is corrugated.

28. The apparatus of claim 27, wherein:

the syphon tube is formed of a resilient material so that it normally biased into a collapsed condition.

29. The apparatus of claim 26, wherein:

said vent path passes through said first flange.

30. The apparatus of claim 27, wherein:

said upper section further comprises an axially extending sidewall, said vent path passing through said sidewall.

31. The apparatus of claim 26, wherein:

the upper section is further adapted to engage a pump structure.

32. The apparatus of claim 27, wherein:

the diameter of said tubular section varies along said tubular section's axial length.

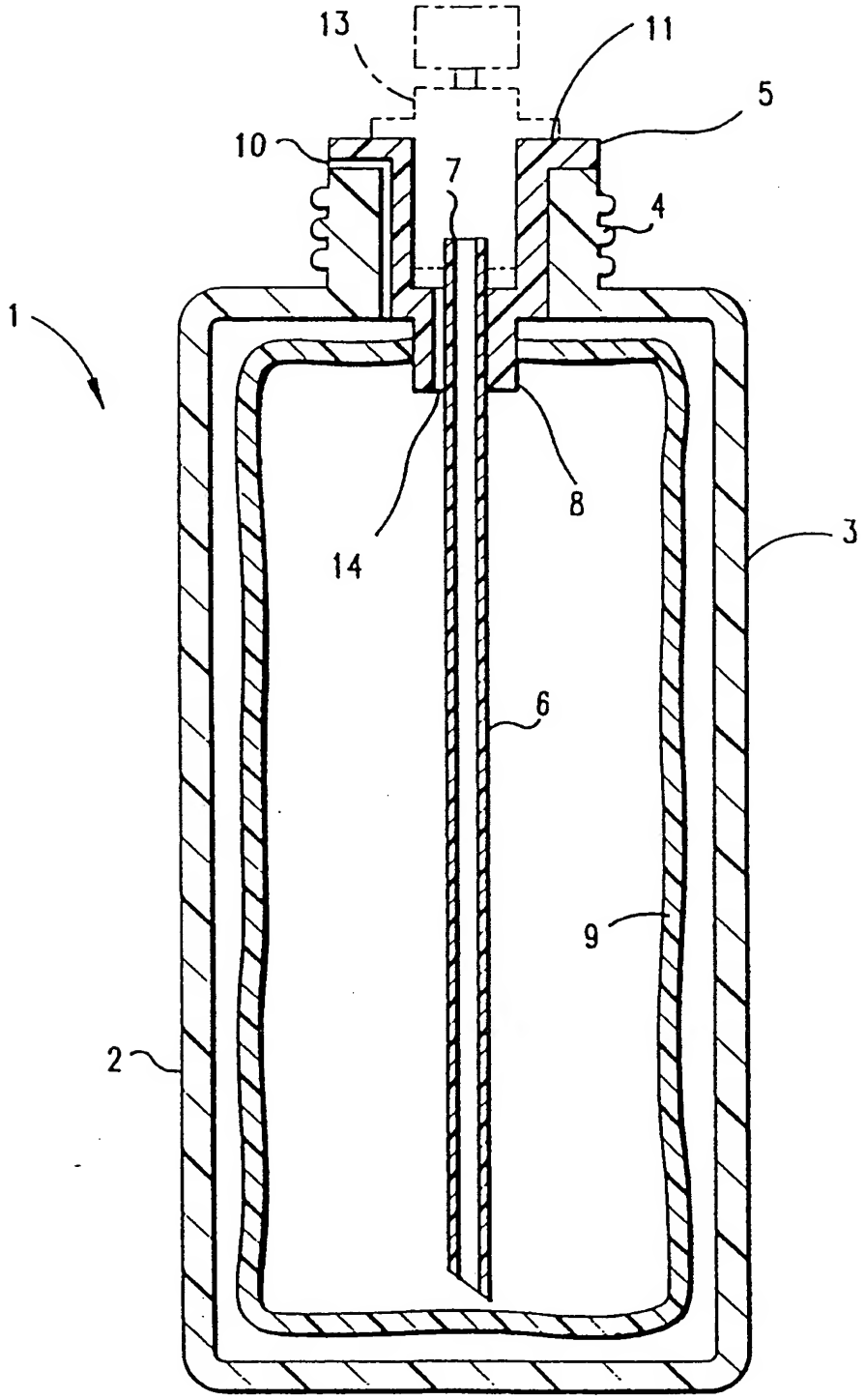

FIG. 1

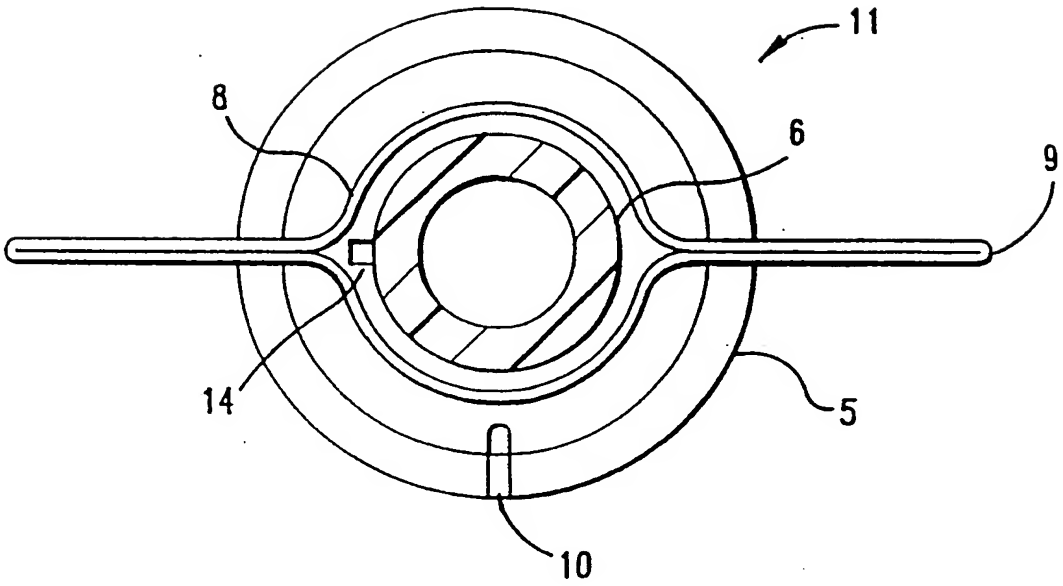

FIG.2

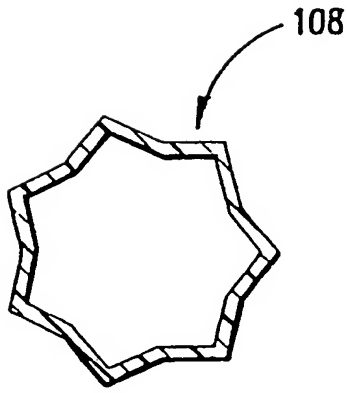

FIG.11

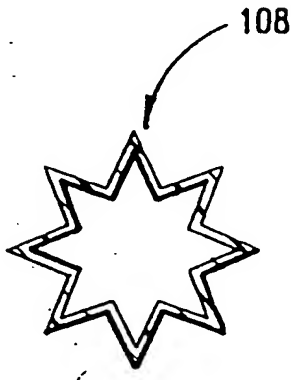

FIG.12

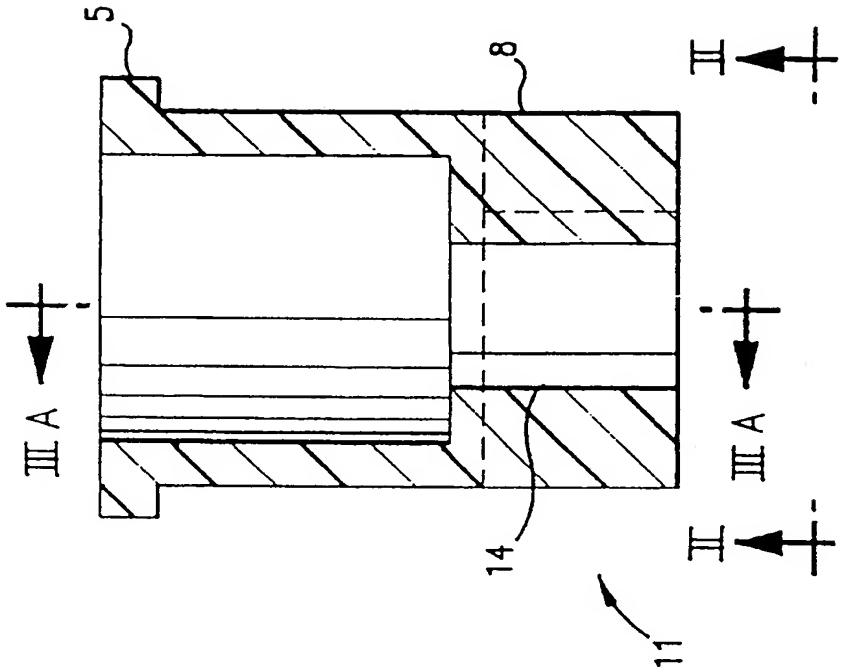

FIG.3b

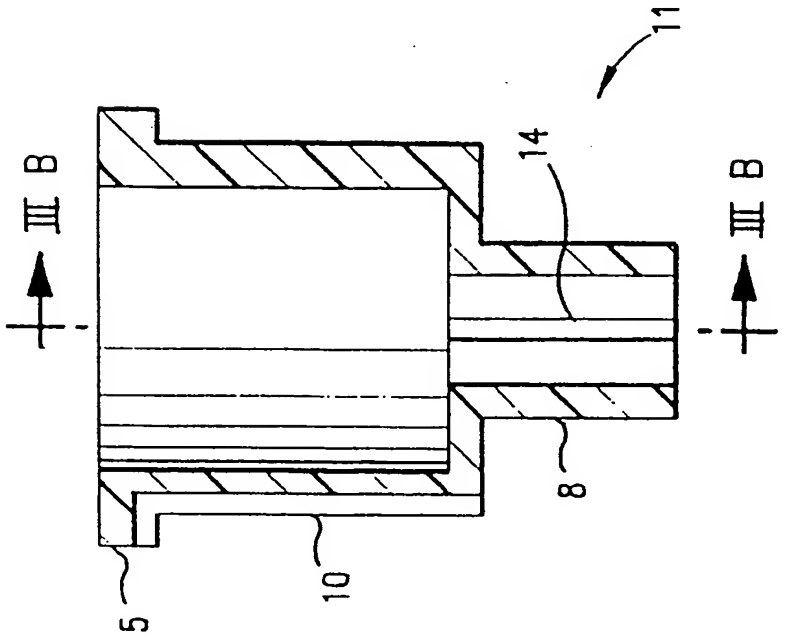

FIG.3a

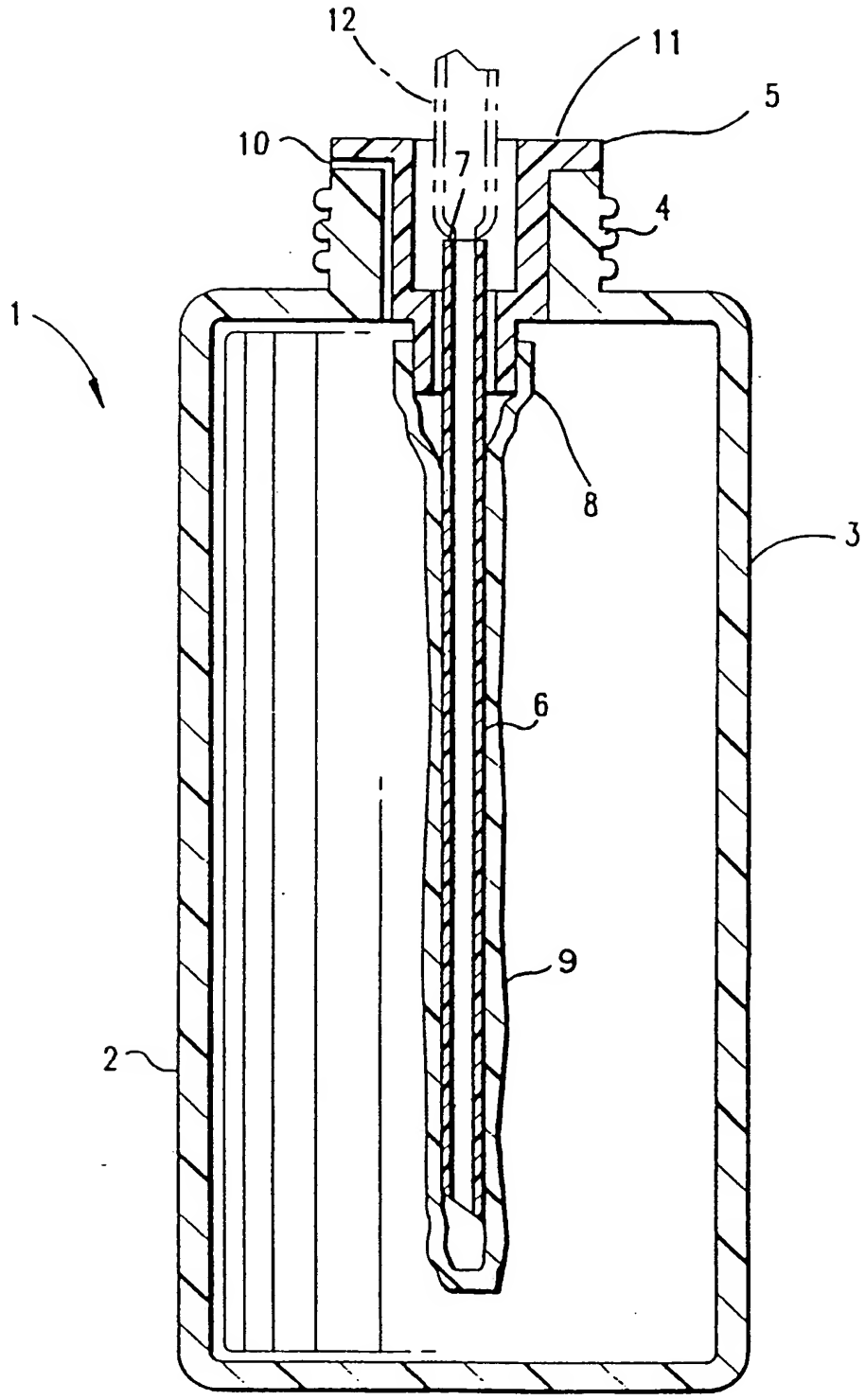

FIG.4

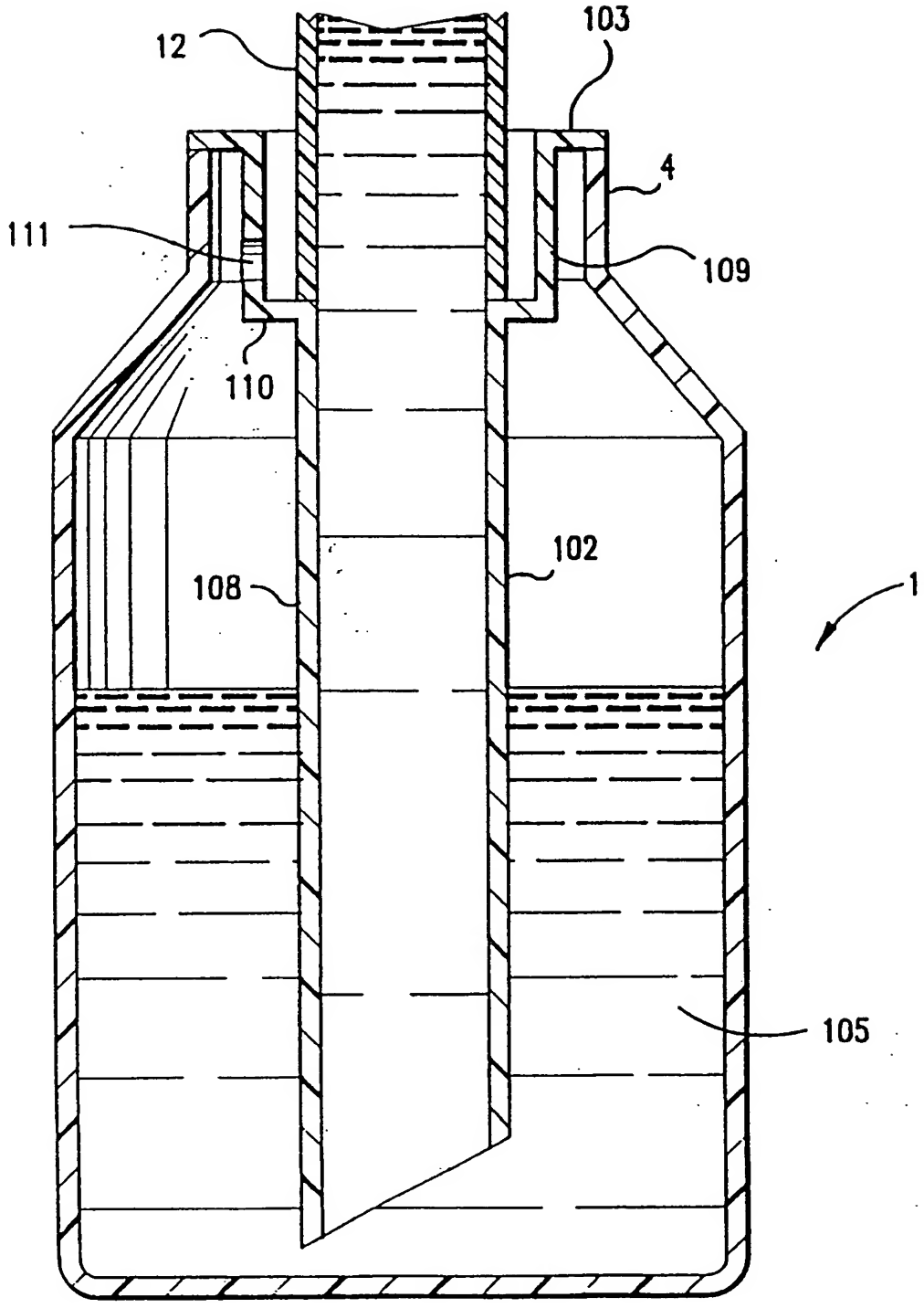

FIG.5

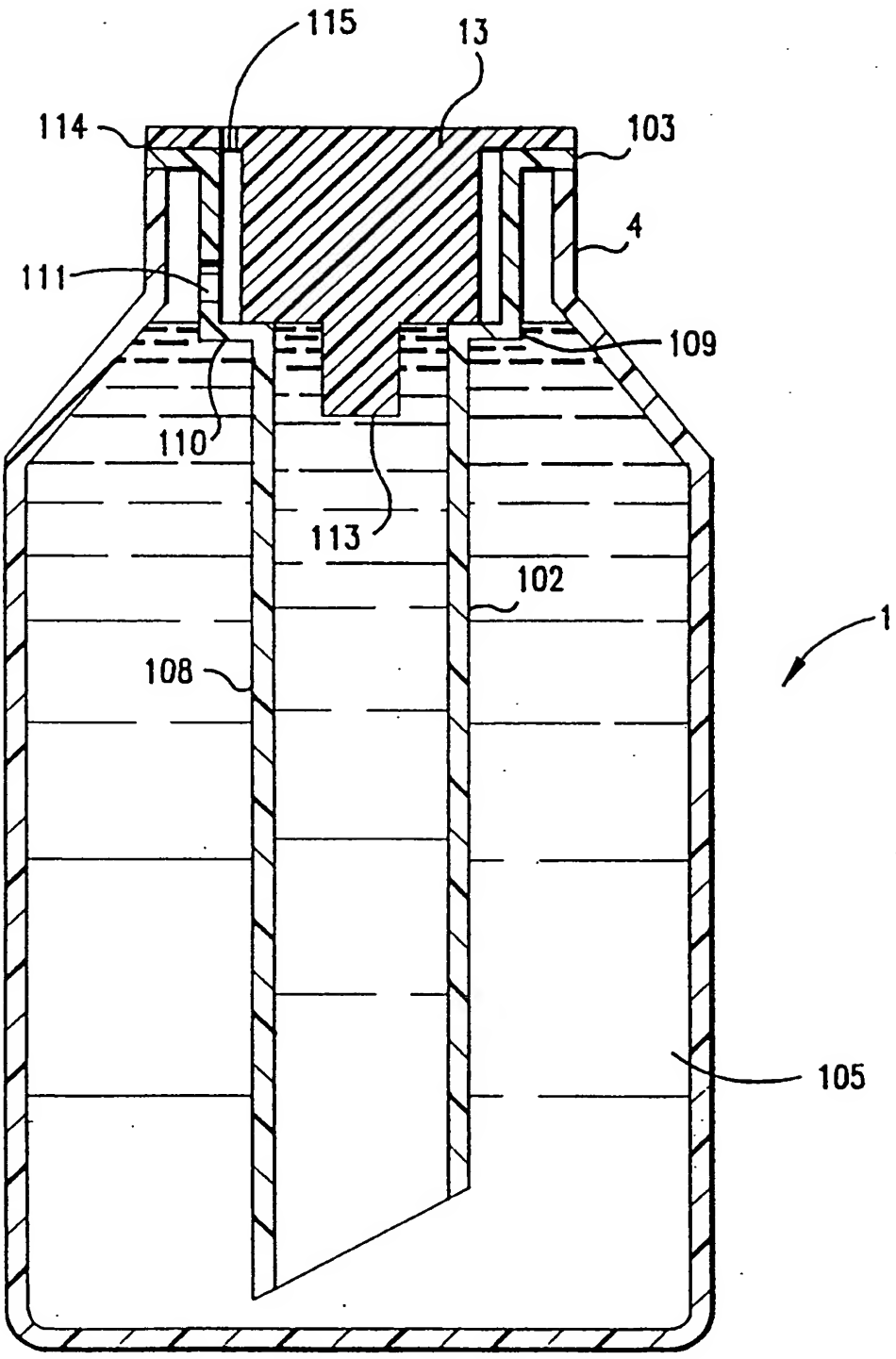

FIG.6

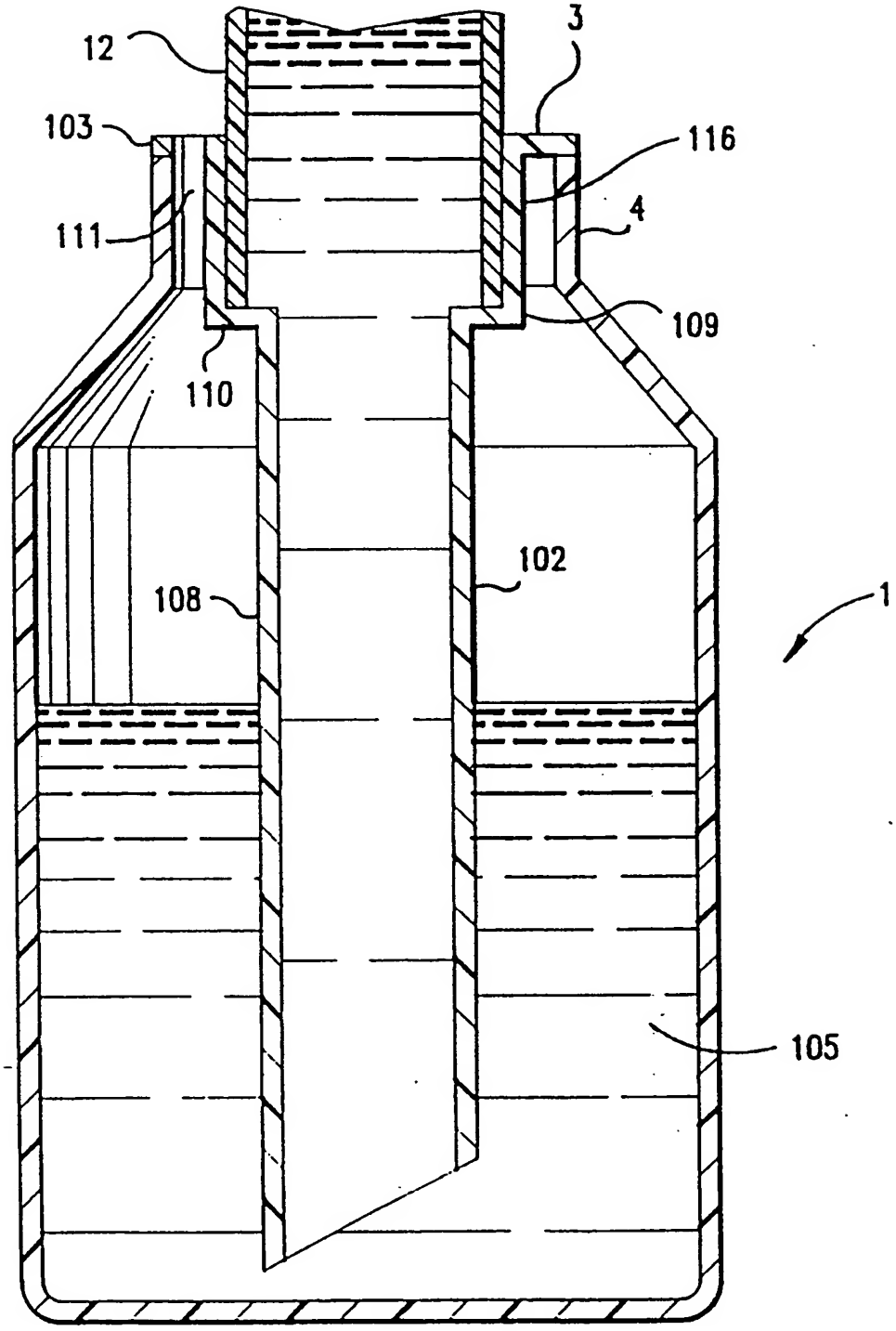

FIG.7

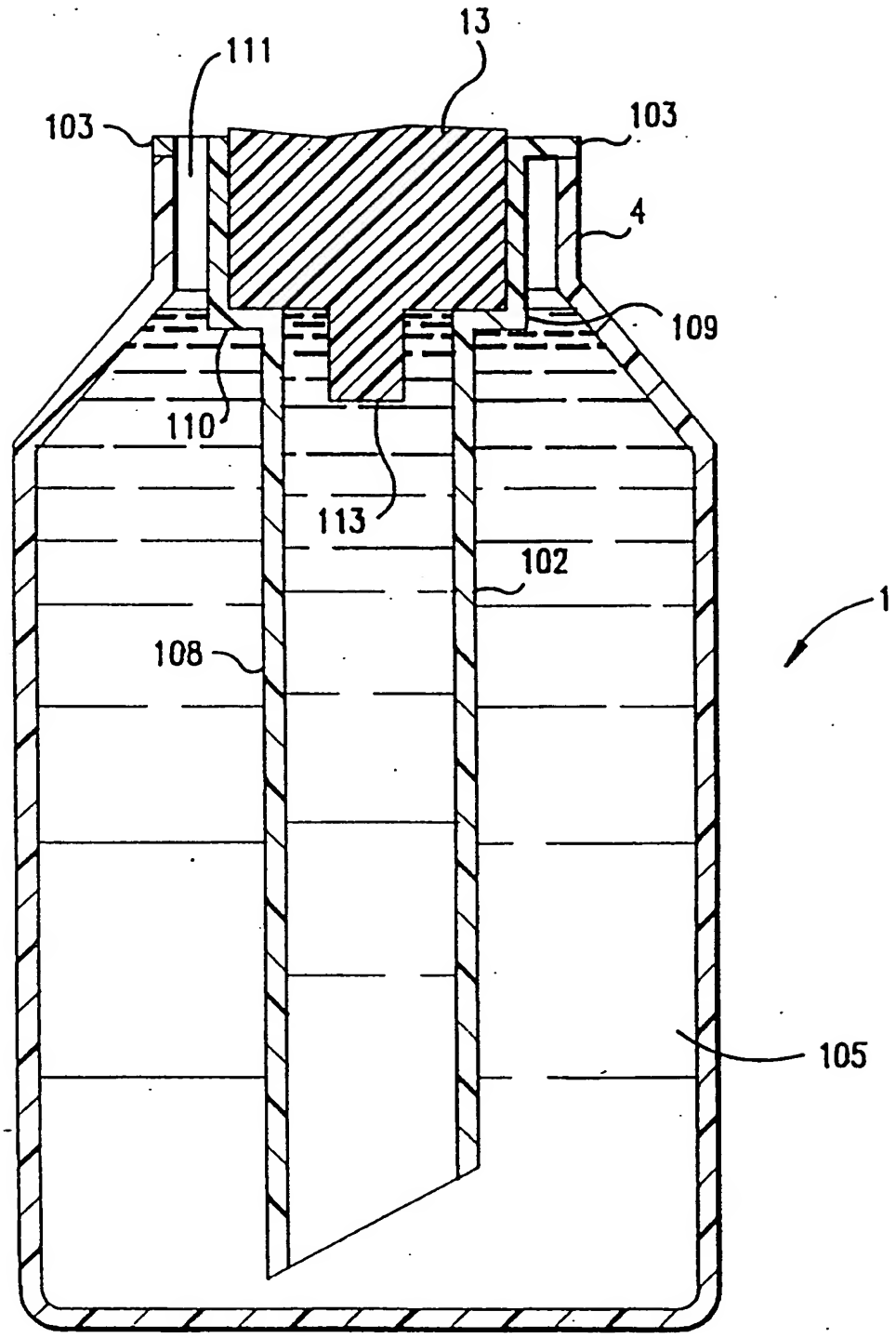

FIG.8

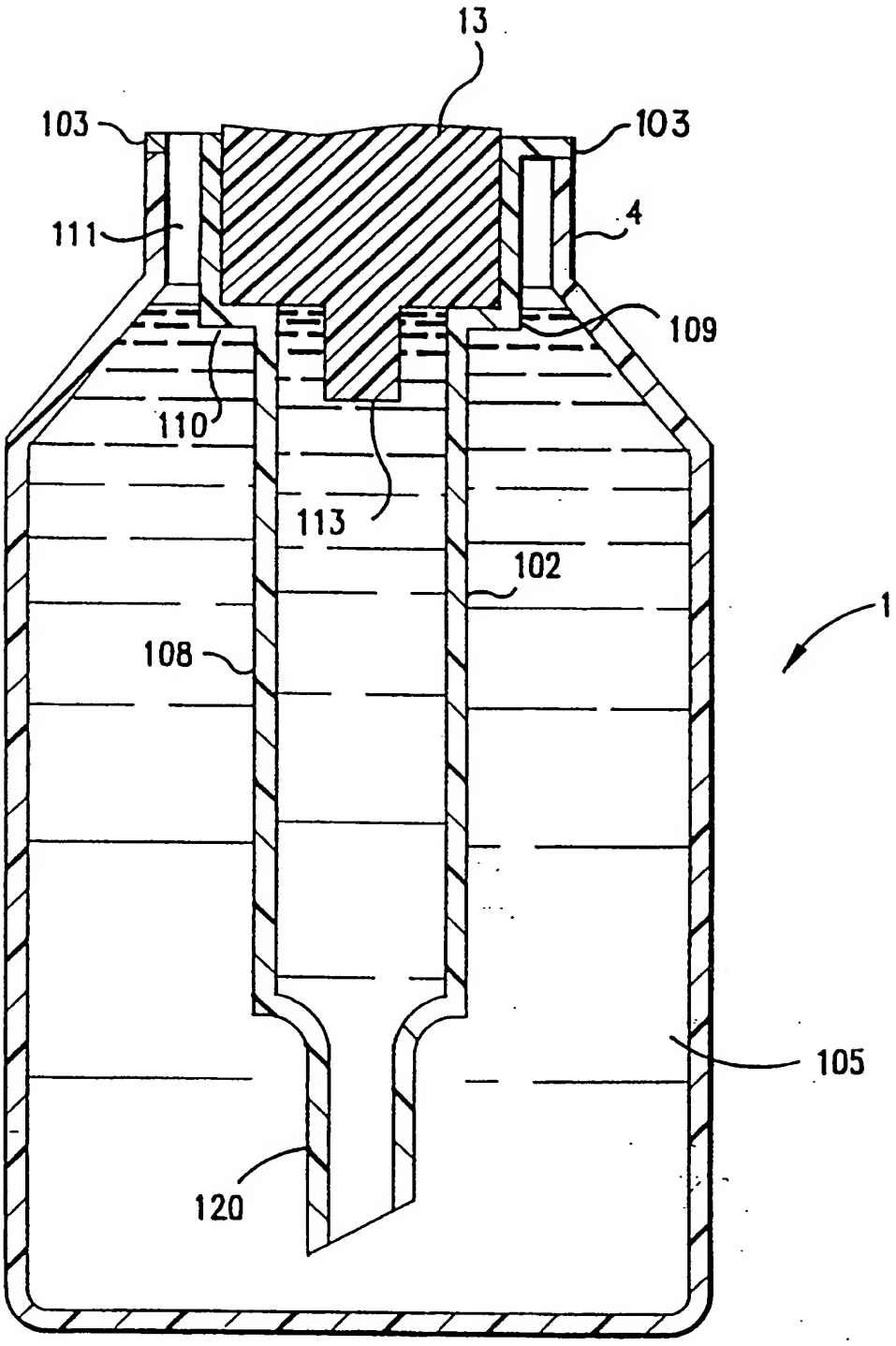

FIG.9

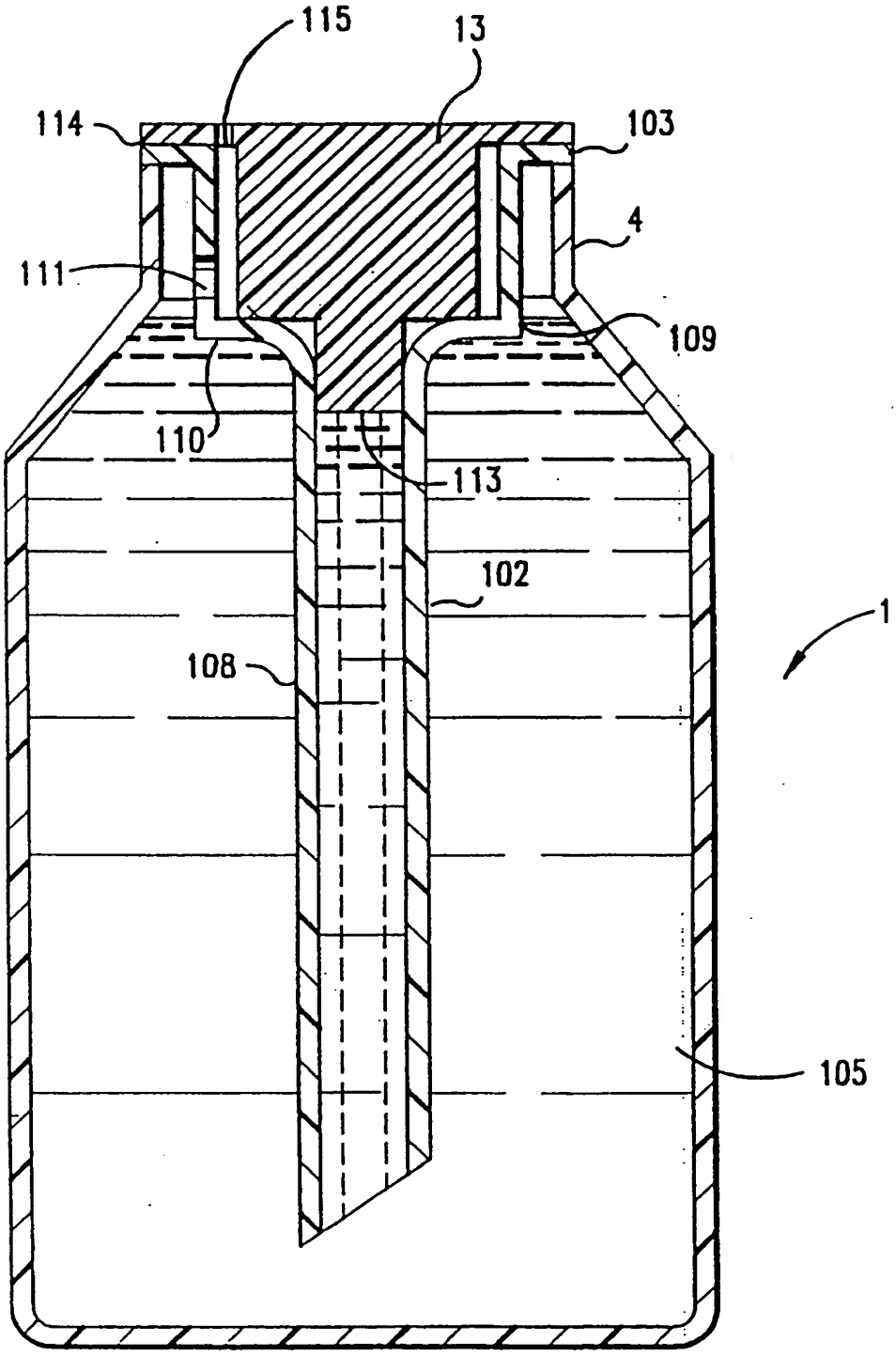

FIG.10

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 11 7030

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
E Y	FR-A-2 685 285 (CLERGET) * the whole document *	1,6-8 2	B65B3/04 B05B11/00
Y	DE-A-27 10 984 (AERO-PUMP) * page 3, paragraph 5 - page 4, paragraph 1; figure 1 *	2	
A	GB-A-2 155 117 (BEARDSLEY) * the whole document *	1,12,26	
A	US-A-3 361 303 (JACUZZI) * the whole document *	1,12,26	
A	US-A-4 457 455 (MESHBERG) * column 3, line 17 - column 4, line 19; figures 1-3B *	1,12,26	

TECHNICAL FIELDS SEARCHED (Int.Cl.6)

B65B
B67D
B05B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	3 January 1997	Claeys, H

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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